

REMARKS

Applicants have carefully reviewed this Application in light of the Final Office Action mailed December 10, 2004. Claims 1-6, 8, 15 and 25 were previously canceled without prejudice or disclaimer. Claims 7, 9-14, 16-24 and 26-30 are now pending in this Application. Claims 7, 9-14, 16-24 and 26-30 stand rejected under 35 U.S.C. §112, first paragraph and 35 U.S.C. §103. Applicants have amended Claims 7, 9, 12-13, 16-21, 26-27 and 29 to further define various features of Applicants' invention. Applicants respectfully request reconsideration and favorable action in this case.

Rejections under 35 U.S.C. § 112

The Examiner rejected Claims 7, 9-14, 16-24, and 26-30 under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors, at the time the application was filed, had possession of the claimed invention.

First, the Examiner asserts that "[t]he specification *discloses* only the spectrum for normal incident (angle of incidence at zero) of the light with "*exposure wavelength*", (please see Figure 5). It is therefore not clear how can one deduce the maximum transmission for a *non-normal incidence*, as recited in claims 7 and 26." (Final Office Action, page 2) As explained by Applicants in the previous Response to Office Action dated October 5, 2004, Claims 7 and 26 were amended to included limitations regarding the thickness of the thin film which maximizes the transmission of light at a particular wavelength at a non-normal incidence. As currently amended, Claim 7 recites: "the optical thickness [of the thin film] being greater than a design thickness by an amount less than or equal to approximately one-quarter of [a] particular wavelength such that transmission of light through the thin film at the particular wavelength at an angle of incidence greater than zero is substantially maximized, the design thickness comprising a thickness of the thin film that maximizes transmission of light incident to the thin film at a normal angle at the particular wavelength." Thus, the thickness of the thin film which provides the substantially maximized transmission of non-normal light at a particular wavelength is specified in Claim 7. Claim 26 recites similar

limitations. Therefore, Applicants respectfully submit that the Examiner withdraw the rejection of Claims 7 and 26.

Second, presumably with respect to Claims 9, 12, 19, 21 and 29, the Examiner asserts that “[i]t is also not clear how to deduce from the spectrum that ‘peak transmission for normal incidence located between approximately one nanometer and approximately twenty nanometer above the exposure wavelength.’ This phrase is not even making any sense.” (Final Office Action, page 3). However, Claims 9, 12, 19, 21 and 29 were amended in Applicants’ *previous* Response to Office Action dated October 5, 2004 in response to this rejection which was previously asserted in the Examiner’s previous Office Action dated July 6, 2004. Claims 9, 12, 19, 21 and 29 no longer contain the language quoted by the Examiner. Moreover, such claims are currently further amended to remove any confusion by the Examiner associated with the term “exposure wavelength.” For at least these reasons, Applicants respectfully submit that the Examiner withdraw these rejections.

Objections to Claims 7, 9-14, 16-24 and 26-30 based on alleged informalities

(1) The Examiner objects to the phrase “the resolution of the projected image” recited in Claims 7 and 17, and the phrase “the resolution of the image projected on the surface” recited in Claim 26 as being unclear as to what is the projected image. (Final Office Action, page 3). Claims 7, as currently amended, recites “light is transmitted at the particular wavelength through the opening in the photomask, through the thin film and onto the wafer to project an image of the photomask opening onto the wafer” and “an increased resolution of the projected image on the wafer.” Applicants submit that it is clear that the image recited in currently-amended Claim 7 is the “image of the photomask opening on the wafer.” In addition, Claims 17 and 26 are similarly amended. For at least these reasons, Applicants respectfully submit that the Examiner withdraw these objections.

(2) The Examiner objects to the phrase “the resolution of the projected image defined at least in part by spatial information contained within light diffracted by the opening” recited in Claim 7, the phrase “the resolution of the projected image defined at least in part by spatial information contained within a portion of the off-axis light diffracted by the opening” recited in Claim 17, and the phrase “the resolution of the image projected on the

surface being defined at least in part by projected spatial information” recited in Claim 26 as being “completely confusing and indefinite since it is not clear what is this spatial information.” (Final Office Action, pages 3-4). As currently amended, Claims 7, 17 and 26 do not recite such limitations. In particular, Claims 7, 17 and 26, as currently amended, do not recite anything regarding “spatial information.” For at least these reasons, Applicants respectfully submit that the Examiner withdraw these objections.

(3) The Examiner objects to the phrase “the thin film including an associated peak in transmission for normal incidence light” recited in Claims 9, 12, 19, 21 and 29 is “wrong and confusing.” (Final Office Action, page 4). According to the Examiner, the thin film is a physical film and thus cannot have an associated peak in transmission. Applicants have amended Claims 9, 12, 19, 21 and 29 to recite the “transmittance” of the thin film, rather than the “transmission” of the thin film.

In addition, the Examiner objects to the phrase “normal incidence light at a wavelength between approximately one nanometer and approximately twenty nanometers above the exposure wavelength” recited in Claims 9, 12, 19, 21 and 29. Applicants submit that Claims 9, 12, 19, 21 and 29, as currently amended, do not include such reference to “approximately one nanometer . . . above the exposure wavelength.”

For at least these reasons, Applicants respectfully submit that the Examiner withdraw these objections.

Rejections under 35 U.S.C. § 103

Claims 7, 9-14, 16-24, and 26-30 stand rejected by the Examiner under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,742,386 issued to Noriyuki Nose et al. (“*Nose*”) in view of U.S. Patent No. 4,657,805 issued to Yasunori Fukumitsu et al. (“*Fukumitsu*”).

Applicants respectfully request the Examiner withdraw these rejections of the claims under 35 U.S.C. §103(a), at least because neither *Nose* nor *Fukumitsu*, whether considered alone or in combination, recites the combination of limitations recited in the claims as currently amended.

For example, currently-amended independent Claim 7 recites:

7. A pellicle operable to transmit light at a particular wavelength, the pellicle comprising:

a frame; and

an amorphous fluoropolymer thin film operable to transmit light at a particular wavelength for projecting a photomask image onto a wafer during a photolithographic process, the thin film including an optical thickness and being coupled to the frame, the optical thickness being greater than a design thickness by an amount less than or equal to approximately one-quarter of the particular wavelength such that transmission of light through the thin film at the particular wavelength at an angle of incidence greater than zero is substantially maximized, the design thickness comprising a thickness of the thin film that maximizes transmission of light incident to the thin film at a normal angle at the particular wavelength;

the thin film formed to cooperate with a photomask including an opening such that when light is transmitted at the particular wavelength through the opening in the photomask, through the thin film and onto the wafer to project an image of the photomask opening onto the wafer, wherein a portion of the transmitted light is diffracted by the photomask opening and passes through the thin film at the angle of incidence greater than zero, the transmission of such portion of light passing through the thin film at the angle of incidence greater than zero being maximized due to the optical thickness of the thin film produces an increased resolution of the projected image on the wafer.

Neither *Nose* nor *Fukumitsu*, whether considered alone or in combination, recites the combination of limitations. For example, neither *Nose* nor *Fukumitsu* recites:

“[a] thin film formed to cooperate with a photomask including an opening such that when light is transmitted at [a] particular wavelength through the opening in the photomask, through the thin film and onto the wafer to project an image of the photomask opening onto the wafer, wherein a portion of the transmitted light is diffracted by the photomask opening and passes through the thin film at the angle of incidence greater than zero, the transmission of such portion of light passing through the thin film at the angle of incidence greater than zero being maximized due to the optical thickness of the thin film produces an increased resolution of the projected image on the wafer.”

Nose discloses an apparatus for detecting foreign matter (such as dust particles) on a substrate by monitoring the transmittance or the reflectivity of a pellicle, and correcting the amount of light projected onto the surface of a photomask based on the monitored value.

(Col. 2, lines 47-53). The apparatus includes optical means for projecting a light beam onto a first surface and a second surface, a first detector for detecting scattered light from foreign matter on the second surface, a second detector for detecting information relating to the reflectivity or the transmittance of the first surface using the light beam reflected by the first surface, and correction means for correcting an output signal from the first detector using an output signal from the second detector. (Col. 2, lines 54-64). In particular, as shown in Figure 1, *Nose* discloses a system for detecting foreign matter a substrate by measuring scattered light caused by such foreign matter along with light that is *reflected off of a pellicle* located over the substrate. (Fig. 1; col. 4, line 22 to col. 5, line 49).

Thus, the pellicle films used in *Nose* are designed for use in detecting foreign matter on an underlying substrate. *Nose* does not disclose using its film in a photolithograph process in which light is passed through an opening in a photomask, through the film and onto a wafer, wherein a portion of the transmitted light is diffracted by the photomask opening and passes through the thin film at a non-normal incidence, and wherein the optical thickness of the thin film is designed to maximize transmission of such diffracted portion of light passing through the film in order to increase the resolution of the image of the photomask opening on the wafer, such as recited in currently-amended Claim 7. Thus, *Nose* discloses nothing about light being diffracted by passing through an opening in a photomask, much less a film having an optical thickness designed to maximize transmission of such diffracted (i.e., non-normal incidence) light in order to increase resolution of a projected image.

Fukumitsu also fails to disclose such limitations. *Fukumitsu* discloses nothing regarding non-normal incident light, much less a film having an optical thickness designed to maximize transmission of non-normal incidence light in order to increase resolution of an image of a photomask opening projected onto a wafer.

For at least these reasons, Applicants respectfully request reconsideration and allowance of amended Claim 7, together with all claims that depend from Claim 7.

As another example, neither *Nose* nor *Fukumitsu*, whether considered alone or in combination, recites the combination of limitations recited in currently-amended independent Claim 26. For example, for at least the reasons discussed above regarding Claim 7, neither *Nose* nor *Fukumitsu* recites:

“projecting the radiant energy through [an] opening in [a] photomask, through [a] thin film and onto a wafer to form an image of the photomask opening on the wafer, wherein a portion of the projected light is diffracted by the photomask opening and passes through the thin film at the angle of incidence greater than zero for which the transmission of light through the film is substantially maximized, such that the thin film substantially maximizes projection of the diffracted portion of light onto the wafer due to the optical thickness of the thin film in order increase the resolution of the image of the photomask opening projected on the wafer.” (amended Claim 26)

For at least these reasons, Applicants respectfully request reconsideration and allowance of amended independent Claim 26, together with all claims that depend from Claim 26. In addition, for reasons analogous to those discussed regarding amended Claims 7 and 26, Applicants respectfully request reconsideration and allowance of amended independent Claim 17, together with all claims that depend from Claim 17.

CONCLUSION

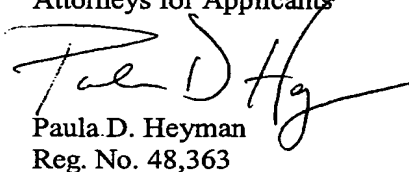
Applicants appreciate the Examiner's careful review of the application. Applicants have now made an earnest effort to place this case in condition for allowance in light of the amendments and remarks set forth above. For the foregoing reasons, Applicants respectfully request reconsideration of the rejections and full allowance of Claims 7, 9-14 and 16-24 and 25-30, as amended.

Applicants believe no fees are due at this time, however, the Commissioner is hereby authorized to charge any fees to Deposit Account No. 50-2148 of Baker Botts L.L.P. in order to effectuate this filing.

If there are any matters concerning this application that may be cleared up in a telephone conversation, please contact Applicants' attorney at 512.322.2581.

Respectfully submitted,

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